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IT based Attempt to Evaluate and Promote Intermodal Transport Solutions in Central and Southeast Europe

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Abstract

The transport sector is one of the main emitters of greenhouse gas emissions. The awareness about this is increasing because of heightened environmental sensitivity among customers, politicians and the media. Studies dealing with sustainability in logistics have been inducted to show that companies around the world are keen to promote "green solutions" through the management of logistics. From now, it is difficult to gauge how far these efforts reflect true desire to help the environment as opposed to enhance public relations. The paper addresses an IT based attempt to evaluate and promote intermodal transport procedures in the corridor of Central and Southeast Europe. Through the assessment of the relative importance of intermodal transport nodes the described tool is a useful instrument to demonstrate the most important advantages for environmental friendly transport solutions. In combination with accessibility as well as network scenario attempts stakeholders have full information available when preparing several transport plans due to transparent strengths of rail and inland waterway transports.

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1. Introduction

The logistic process can reach from the raw material source through production and distribution to the point of consumption including the final reverse activities (Dey et al., 2011). Therefore, companies create supply chain relationships for a proper, effective development of the operational capability (Sandberg and Abrahamsson, 2011). Common, growing concerns over issues such as the limitation of resources, global warming, greenhouse gases and consumer health have increased the needs of rethinking the term sustainability within business strategies of all partners in the supply chain. Transport is responsible for different kinds of externalities like air pollution, noise, accidents, vibration, soil sealing and visual intrusion. By looking 40 years ahead and facing these negative

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influences, the current development cannot continue the same path. If all stakeholders in the transport industry stick to the 'business as usual' approach the CO_2 emissions from transport would remain one third higher than their 1990 level by 2050. Desey and Dobias mentioned the development of sustainability in transport logistics during the 1980s and the early 1990s, when the focus in limiting emissions from road transport was basically on technical solutions. Behavioural aspects were described partly (Desey and Dobias, 1992). In previous years, the trend towards more environmental and social responsibility operation management practice suggests multiple options for corporations to improve sustainable performance (Aronsson and Brodin, 2006). Halldórsson and Kovács stated that a considerable rethinking on the operational level as well as even on the conceptual level is essential (Halldórsson and Kovács 2010). Bretzke and Barkawi conducted that the business model of a company has an important impact on how green it can operate. For example, if a company's strategy is about offering products at a low price level the model could indicate that the company will focus on high rates of utilization in transportation as the transport costs per unit of the product need be as low as possible. If a company has a competitive advantage through quick response to customers the business model accepts low utilization of the vehicles. Additionally, the two authors mention that in the future not only innovative technologies are needed but innovative processes and network architectures would help to operate more efficient and "green" (Bretzke and Barkawi, 2010).

2. Methodology

Based on the theoretical reviewed issues of sustainable logistics, this part of the paper looks at additional findings of a pre-feasibility study (tools, numbers and data were developed and investigated in books, articles, journals/newspapers and websites covering various topics of logistics which were collected in a pre-feasibility study during the project *FLAVIA* - Logistikum Steyr, University Pardubice, 2012) combined with expert interviews during a workshop setting where logistics service providers, shippers and authorities came together and discussed the findings from this literature review (pre-feasibility study). By comparing both designs (literature review, expert interviews) existing and future gaps from theory and industry hindering sustainable operation management within transport industry are identified. The identification of tools to make transport operations "green", as main task of the pre-feasibility study described, include opportunities in the section of technical, organizational, normative/legislative and transversal areas in order get a full picture about its key enablers. This paper focuses on the transversal points which refer mainly to training and information of staff. Critical success factors to realize the idea of enhancing sustainable transport procedures in the industry are directly linked to the willingness of companies and the society to change something. Additionally, knowledge of sustainable operations is often not concrete and information is not transparent given. This could lead to a fast, inconsiderate decision against a "greener" transportation solution or a more environmental friendly mode. To sum up, the availability of combined transport and the operative transport planning process were evaluated as one of the most important fields when talking about Green Logistics solutions (operational tools). Comments indicate that especially intermodal transport solutions are used by shippers when adequate transport offers (including pre and post run), created by logistic service providers which match the shippers needs, are available. With the help of a web based IT solution, public authorities, logistics associations, operators, infrastructure providers and scientific institutions shall be able to analyze intermodal transport procedures across Europe. To make intermodal transport more competitive to road haulage it is important to provide a one-stop-shop to simplify the access to intermodal transport. One problem is seen in the isolation of information in the different groups of market actors. Applications for planning, management and control/monitoring of whole intermodal transport chains are needed by the transport sector. Based on these needs a great focus has to be set on the analysis of existing applications which provide information for intermodal transport planning. In the following existing tools will be shortly described (most of them have been developed within research projects) (Michalk et al., 2011).

3. IT tools and information

The descriptions provided below are based on a survey conducted by Meimbresse (2013) which summarizes existing solutions on the market. Product reports and brochures as well as internet documents give an impression what kind of intermodal information & routing tools exist.

3.1. DISMOD

DISMOD (http://www.iml.fraunhofer.de/) was developed by Fraunhofer IML and is a tool for planning, optimizing and reengineering of transport and supply chains. The application provides features like optimization of warehouse and production locations, improvement of capacity use and calculation of delivery districts. The sub-tool “route” provides general tour building features.

3.2. BeLogic

BeLogic (www.be-logic.info) is a project funded by the European Commission (7th Framework Programme) and was carried out between September 2008 and February 2011. One of the main aims of the project was to enhance quality and efficiency across modes of transport. One scope was the definition of an intermodal route finder for Europe. The user can select origin and destination of the transport and an allowed transport time. As a result, the application gives an answer via a list of possible transport chains with total transport time, mode per chain segment and transshipment terminal.

3.3. EcoTransIT

EcoTransIT (http://www.ecotransit.org/) is an ecologically focused information tool for freight transport covering all continents. EcoTransIT calculates and compares direct and indirect energy consumption as well as emissions during freight transport operations by all different modes of transport (rail, road, ship and aircraft in any combination, also of different technical standards of vehicles). The tool can calculate multimodal routings. Additionally, it is possible to add several routing points to the customized routing portfolio, also intermodal terminals. The tool delivers a comprehensive database of the energy and emission results and comparisons based on automatically calculated routes for single or combined transport modes. The system is based on a GIS-window which indicates the transport route for each transport case. The development of the tool is user/company driven as large intermodal service providers like DB Schenker, Hapag-Lloyd and Gebr. Weiss use the tool for their operational work.

3.4. IMOTRIS

IMOTRIS (http://www.imotris.de/) is a German R&D project carried out between 2010 and 2012. Here the focused is based on the optimization/development of new transport chains covering the Baltic Sea ports (geographical coverage of the tool are the Baltic Sea countries). The application offers a sales and marketing platform for transport service providers. The usage of Open-Street-Map and similar sources were used for the routing networks. The tool can evaluate optimal transport routes for freight transports using parameters like capacities, transit time and ecological impacts. Additionally it lists and optimizes transport chains consisting of different service providers.

3.5. IMTIS

The version of this application offers trimodal usage, (IMTIS 5: http://www.contargo.net/en/) provided by CONTARGO - a large intermodal transport operator. The application calculates routes and transport price components in combined/intermodal transport for inland navigation, rail and road. The terminals/ports operated/addressed by CONTARGO are selectable only. Therefore, the tool reflects a focused (limited) share on the European intermodal market. For the calculation of transport prices IMTIS takes into account toll taxes for road transport and bunker charges (BAF) for inland navigation.

3.6. Projects dealing with ICT solutions

Due to the need of efficient logistic procedures, a growing demand for the ICT solutions optimizing transport and logistics activities can be observed in various projects. This is the reason that lot of the transport oriented research projects tries to implement ICT tool being supportive for the freight transport decision makers in different phases of transport services. The following projects can be seen as representative choice. Descriptions are directly taken from the TransBaltic action Report 5.3 "Review of the ICT Tools supporting green logistics developed in the INTERREG transport projects" (2012)

- TRANSBALTIC

"Logit 4SEE™ delivers a global, proactive , multi-modal freight planning and monitoring service that offers full visibility and supply chain event management, using web based applications that are simple to use, whatever the complexity of logistics process is."

- SCANDRIA

"The development of software solutions was not in focus in Scandria, however there were some activities, like use of the SoNorA (South-North Axis) Tool applied for Scandria Corridor and the EcoTransIT-tool which has been optimized for Baltic Sea ferry transport in the Scandria corridor."

- EAST WEST TRANSPORT CORRIDOR II

"It is an ITS system for parking information in the East - West corridor. The system develops pre- and on-trip ITS solutions with location information about the truck parking areas. It is the responsibility of the public authorities to develop basic digital information about the location of truck parking areas and add pretrip information to ferries and truck stops about suitable truck stops on the continued journey."

- RAIL BALTICA GROWTH CORRIDOR

"Internet based intermodal node information system offers users from business, politics and public administration sectors a comprehensive overview of the access to the railway system via transshipment points."

- North East Cargo Link II

"Logistic ICT-solution for transport matching - Development of an ICT portal in work package 5 of NECL II includes transforming an existing ICT system prototype into a fully operating transport matching system. Working in the daily operations at freight managers and logistics centers, for instance ports and decreasing the big volume of empty or partially loaded transports of today. The importance of its further development has been pointed out by several cargo owners and transport operators. The system will be connected to the logistics centers data handling systems."

When comparing several tools it becomes evident that the majority of the approaches being developed focus on optimization of modal choice basing on a travel planner concept (routing). The main idea of attracting sustainable modes of transport is supply of market information concerning time schedules and freight rates enabling easy comparisons of a competitive power of different mode (Dębicki, Andrzejewski, 2012). Therefore the following *FLAVIA* tool was developed which uses creation paths in order to obtain scenarios by changing the infrastructure network. Furthermore, the *FLAVIA* tool has additional functions which will be described in the following.

4. Current development of the FLAVIA tool

Within the scope of the CENTRAL EUROPE projects *FLAVIA* and SoNorA a web-based IT-tool was further developed to provide the opportunity creating intermodal transport chains. The INTERREG projects SoNorA and finally in *FLAVIA* more and more functionalities were added as well as the underlying maps were revised.

Generally, the tool is a trip chain generator for intermodal freight (containers, swap bodies and trailers) in the first line. It can calculate a trip chain from X to Y using and combining different transport modes: rail, road, inland waterway and short sea shipping/ferries. Additionally, intermodal terminals serve as nodes connecting the different networks (modes of transport). As such it is a route planning tool.

Basing on the routing application the *FLAVIA* tool has been developed with the following functions:

- Basic Function: GIS (Geographical Information System) based generation and display of intermodal transport routes on the basis of underlying networks (road, rail, inland waterway, transhipment terminals) and according to defined criteria and transport requirements using the Dijkstra-algorithm which was adapted to a multi-network approach (Dijkstra, 1959). The algorithm describes a solution for a directed, weighted graph G:

  G = (N, S) with nodes N
  N (G) = {ni | i = 1,….,n}, segments S
  S (G) = {sij = <ni, nj > and ni, nj   N(G)} and not negative weights for all sij.

- Alternative Routes Function: Calculation and comparison of route-alternatives by criteria: distance, time, costs and energy consumption.
- Via-Point Function: Possibility to define up to 2 via-points for the source-destination relation in order to prefer specific transport corridors or transhipment terminals.
- Information Function: Presentation of information (contacts, service portfolio) of suitable logistics service providers (e.g. special provider for inland navigation) and transhipment terminals for each part of the generated transport chains.

The *FLAVIA* tool was implemented for the geographical zone of continental Europe and the islands. The networks for the routing include 10,000 rail segments (only freight) and 700 inland waterway segments. Network section delimiters are junctions, crossings, intermodal terminals, and changing points of segment characteristics (e.g. gauge or number of tracks). For the road network a classified part of Openstreetmaps is integrated. Furthermore, 600 intermodal terminals and ports with intermodal capabilities are included. The *FLAVIA* tool has now also a function “accessibility of a location” which provides selected intermodal terminal iso-curves on a map for a given value regarding time, distance, costs and energy consumption. The maps visualize how far an intermodal unit (container, swap body, trailer) can be transport in all directions with a given resource (time, cost, energy). It has to be mentioned that the paths in all directions are calculated as intermodal trip chains. That means that along one specific path the mode of transport can change if a terminal for transshipment is available. Furthermore all intermodal terminals in the map are marked with stars which are inside the iso-curve. During the *FLAVIA* project the tool has been extended by additional functions. The new functions help to make the tool more dynamic and more customizable for the user. The user can determine self-chosen events at segments of the network (Event Function). So, the user can simulate a situation which influences the routing tool result negatively or positively (in a given scenario). Such an event could be construction works on a certain section of the railway network. The user can reduce the velocity limit of the section and hence the overall routing result is affected. Furthermore, it is possible to determine security-relevant parameters at the intermodal terminals. This would mean for instance that the terminal would not be considered during the routing calculations. As a result, the containers are transshipped at another terminal where the security conditions are acceptable. Currently, another function is planned which help to increase the degree of realism of the underlying transport network. On the basis of train running times (gathered via GPS-equipment) bottlenecks along the transport network shall be visualized (Bottleneck Function). This might include waiting times at borders or sections with restricted speed.

4.1. Accessibility approach

The question that will be answered is: how far can a transport unit (TEU) be transported with a certain amount of defined parameters (based on the different optimization parameters: costs, distance, duration and energy consumption) by using (the combination) of different modes of transport, starting from one point A. As a result, the tool shows a map with defined iso-curves representing the reachable area (including all terminals) within 33 %, 67

% and 100 % of the given value. During the whole computing process the online based application stores in a temporary database how far a routing is able to get without exceeding the defined values. This attempt can help to get good insights in spatial interdependencies and enables decision makers to analyze the reasons of limited accessibility within a certain region (corridor) as proposed in the *FLAVIA* project (Behnke, Meimbresse, 2012).

The accessibility model considers transport time and costs as the most important factors, when choosing a transport solution among several. In addition, qualitative location factors like the ability to serve as a gateway for a region are added to an evaluation model. For this purpose the area of Austria to the direction of Southeast Europe is in focus where specific nodes have been picked out. The used web based routing tool (*FLAVIA* tool) can calculate transport processes according duration and costs. In order to determine a so called "strategic quality" of locations of intermodal transport nodes, also named inland terminals as well as ports, the accessibility of these points has to be evaluated. Therefore a comparison, based on defined transport parameters, of different intermodal terminals along a specific corridor is one attempt to get results dealing with the mentioned accessibility. Accessibility is determined as possibility to reach several nodes on a geographical path in order to carry out commercial or private actions (Morris and Dumble, 1979). For this study, the term accessibility is defined as procedure to evaluate and compare different geographical locations, transport modes and network structures. The *FLAVIA* tool provides information about the underlying infrastructure network, geographical positions, available transport modes, transport costs and the distribution of potential locations. With the given features of the *FLAVIA* tool intermodal transport nodes can be evaluated and compared in regard to costs and time to reach other accessible locations within regional centers. For this purpose, an already implemented "benchmarking attempt" is used.[*] The *FLAVIA* tool uses the so called indicator group "distance based measures" in which one starting point X is given and different destinations/activity potentials Yi are included to compare values like distances, time needed, costs and energy consumptions. The tool provides the user with the function "accessibility of a location" where selected intermodal terminals are mapped within iso-curves for the mentioned given values. The maps visualize how far an intermodal unit (container, swap body, trailer) can be transported in all directions with a given resource. The paths are calculated as intermodal transport chains which mean that on these routes the mode of transport can change if a terminal for transshipment is available. Additionally, population data defining exactly the term regional center are taken from the Europeans Unions Commission statistical online databank "EUROSTAT" (Eurostat Regions and cities statistics, 2013). The following part focuses on Central Europe, basically on Austrian inland terminals and ports into the direction of Southeast Europe. Therefore the regional center Upper Austria (Wels, Ennshafen, Linz) and Lower Austria (Krems, Vienna surrounding) and the terminals in Vienna were chosen as representative example to demonstrate how such a web based routing tool can be used to analyze and provide important information for e.g. policy makers in order to decide on the possible impact of infrastructure investments in a certain region. Based on the given values the numbers of accessible transport nodes with a transport budget of € 300 per TEU and a transport time of 10 hours were ascertained. This value might appear arbitrary, but there exist the argument that if a great number of regional nodes can be reached within a given cost/time frame, an even larger number could be reached in any larger frame. With the mentioned iso-curves the required resource can be determined which is already a part of any longer travel time or any larger transport budget from the analyzed node on (the outer curve requires more resources, here budget and time, than the inner curve). The following nodes fulfil both parameters (time and cost frame). The nodes of Bratislava and Zilina are within the € 300 and the 10 hours range of the analyzed cluster region Upper Austria (Wels, Ennshafen, Linz) and the port of Krems in Lower Austria. Kosice is also within a cost frame of € 300 (starting from Krems) but the node indicates a longer transport time by road (duration as optimization criteria – 11 hours). Due the given geographical position, the analyzed points can serve as a strategic European key point within the intermodal transport network. New intermodal services from the Adriatic ports to Slovakia are seen as important future waypoints. Furthermost nodes accessible from the terminals in Vienna (here: Wien Hafen and Wien-Nordwest) are Dobrá, Szeged and also Arad. Transport routes between Central Europe (here Slovakia) and the

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[*] The methodology to get an accessibility attempt is based on the findings in: B. Meimbresse, P. Michalk, C.S. Schmidt: "Benchmarking Accessibility of Ports and Inland Terminals in European Corridor Projects";

southern CIS counties, e.g. Russia can be mentioned. The obstacle of different rail gauges within the interoperability issue could be solved by highly productive transshipment points, as one exists in Dobrá.

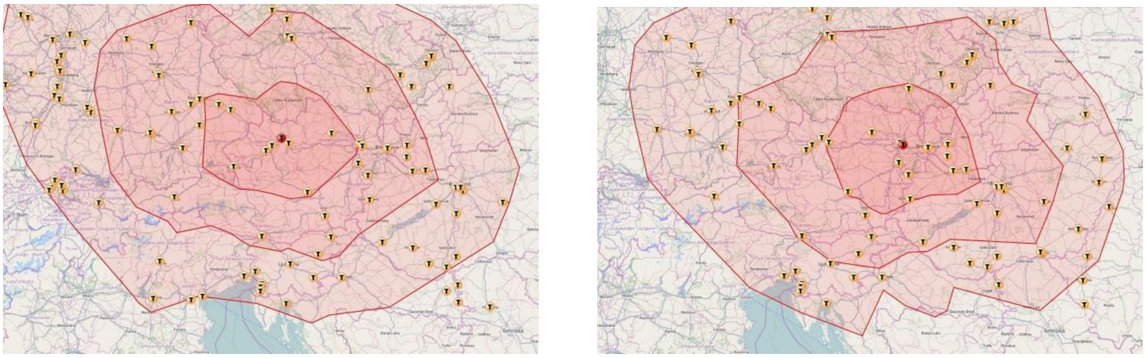

Fig. 1: Accessible terminals within a 10 hours range, starting from the port of Linz (left) and Vienna (right)

As shown in figure 1, the number of nodes reachable within the given cost frame from a port, is much larger than the number of nodes reached from an inland terminal with the same cost parameter. This fact can be explained by lower costs of sea transport that enables a longer range with the € 300 budget per TEU. This argument can be shown with the following analyses. First, a routing between Wien Hafen and Constanta (transport by IWW) has been carried out. Here the costs were calculated with € 456 per TEU. This transport budget was now the new parameter and the *FLAVIA* tool should analyze how far the transport mode rail and road can reach with the new figure. The result indicates that Valcea (Romania) was the south-eastern part of the area in question which is 417 km (road) away from Constanta.

4.2. Network/terminal scenarios

Based on the latest development of the application, it is now also possible to demonstrate scenarios by changing several (default) parameters/attributes of the nodes affecting the infrastructural part. Default parameters are defined originally by literature reviews and expert interviews (market study) which can be seen in figure 2. The computed iso-curves shown in figure 1 are useful as information as it is, but in combination with the possibility to adopt some network attributes (also on a global level) or add/delete specific points within the intermodal network (nodes/terminals), this feature can be seen as unique tool to provide results of pre- as well as post analyses, case studies and scenario comparisons. With the possibility to do some modifications with the *FLAVIA* tool, the situation of the intermodal network can be simulated. For example changes in infrastructure of a terminal, extension of an existing terminal, building a new terminal, change of terminal access public and private, etc. bring changes in the evaluation of the best routing option. Within this scenario framework, it is also possible to change global attributes of the networks and nodes/terminals (e.g. reduction of energy consumption of a certain transport mode). This is why the changes on a macro-level can be analyzed. Users of intermodal transportation services as well as logistics service providers shall be supported by the mentioned application in their strategic planning of transport procedures by adopting reliable information about intermodal networks and terminals (Behnke, Meimbresse, 2012).

Fig. 2: Example for changeable attributes in the scenario

5. User benefits

Shifting trucks from road to rail can help to reduce emissions as well as making the transport movement more efficient by higher utilization and the combination of different modes. The hurdles in the intermodal transport are mainly i) the communication between companies concerning ports and inland terminals, ii) a lack in liner services and information about offered services related to the logistic service provider and also iii) the lack of information about the services offered (Rotter, Hofmann-Prokopczyk, Plasch and Starkl, 2012). However, a lack of knowledge influences the intermodal rail transportation balance negatively (Behnke, Meimbresse, 2012). In general, access to the tool is free of charge after registration but only for noncommercial use (Technical University of Applied Sciences Wildau is the owner of the tool and is responsible for access rules). The data maintenance is done within the terminal data yearly; networks from time to time (if new or updated segments are mentioned in the relevant journals); transport offers (only the connection with out times) based on rail timetables two-yearly; rail speed profiles only as average (Meimbresse, 2013). Especially the comparison with road transport is essential as most of the goods are carried out by this mode of transport. The transport operation between Wels (Austria) and Arad (Romania) was selected for the paper as these points are located within the so called *FLAVIA* area which in turn is characterized by several chances to evaluate and support intermodal transport solutions along the corridor. The connection was also identified among the 10 most important connections within the *FLAVIA* corridor (Dedicated Transport Chains – Project *FLAVIA*, 2013). Goods get transported to the railway terminal in Wels (AT). The main haulage is done by railway between Wels (AT) and Arad (RO). Afterwards the final transport is again done by trucks. Trains run three times a week from the terminal in Wels (AT) to the Rumanian terminals Curtici (railport Arad) and Ploiesti (40 km north of Bucharest). The duration needed form Wels to Curtici (railport Arad) is15 hours and from Wels to Ploiesti 26 hours.

The route between Wels (Austria) and Arad (Romania) is published through the geographic information system shown in the following figure 3:

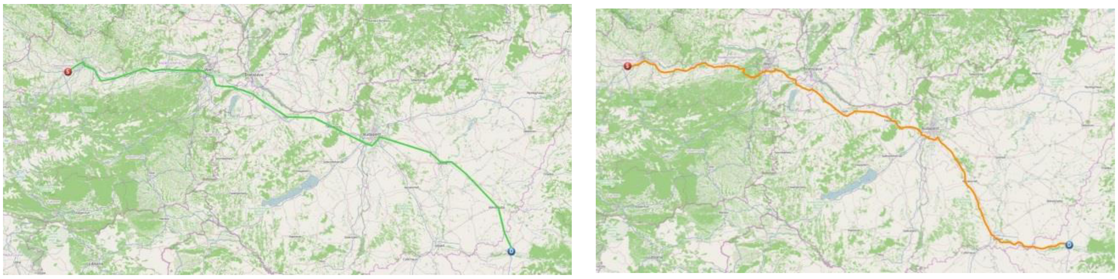

Fig. 3: transport route between Wels and Arad (left rail, right road)

In addition to the visualization possibility (a first feeling for the given distances and passed nodes can be achieved) more facts and figures are required to provide transparent information to all relevant stakeholders who have the possibility to support intermodal transport solutions. For rail transport the data from table 1 are available within the *FLAVIA* tool:

Table 1: Transport data (Wels - Arad by Rail)

From	To	Mode	No. Vehicle	Duration (d,hh)	Distance (km)	Eco (MJ)	Costs (€)
Wels	Arad	Rail	1	15 h	710 km	4360 MJ	411 €

Such information can help to promote rail transports within the main run of an intermodal transport. Here concrete data (based on an internal calculation base) can be provided to customers, public authorities and further stakeholders interested in getting transparent information for several transport solutions. Table 2 shows the comparison of several transport modes with the same parameters (route, transport capacity TEU, transport quantity, optimization mode). This can help to separate different transport solutions.

Table 2: Comparison of transport data (rail and road)

From	To	Mode	No. Vehicle	Duration (d,hh)	Distance (km)	Eco (MJ)	Costs (€)
Wels	Arad	Rail	1	15 h	710 km	4360 MJ	411 €
Wels	Arad	Road	1	14 h	713 km	9799 MJ	841 €

The possibility to display all partners involved in the analyzed transport process within the *FLAVIA* tool represents another advantage when showing transparent information for several stakeholders, here shippers who want to have exact information about the logistics service providers available and their offered services (information like the name of the logistic service provider, description of services offered and several contact data are available).

6. Conclusion and Outlook

Critical success factors to realize the idea of making logistical operations more "greener" is the factor of providing capital on the one hand and the willingness of companies and the society on the other hand. Additionally the knowledge in this area is often not given or information is not transparent enough. This could also lead to a fast, inconsiderate decision against a "greener" transportation solution or a more environmental friendly mode. Thus there is a need to increase awareness of the society and the companies in the *FLAVIA* corridor and whole Europe.

With the shown attempt knowledge can be presented in a transparent way. Special statements like "road transports cause high CO2 emissions" can be demonstrated on a more visual base. This in turn brings great possibility to promote environmental friendly transport solutions like the transport by rail or IWW which in turn are also part of intermodal transport solutions. Also a fast and easy overview about possible transport partners are available which can help to reduce obstacles (no overview about services offered, bad communication between LSP and shippers and general lack of information about alterative transport solutions next to road transports). The accessibility attempt can be used to evaluate the quality of single transport nodes not only for infrastructural facilities but also for specific regions or agglomerations. With such a transparent methodology potentials can be shown in a targeted oriented way. Especially the topic knowledge sharing is essential here because different stakeholders can use the power of visualization regarding important decision making processes. Concerning tool transferability to other regions, it is planned to expand the data into the geographic direction of eastern located countries (e.g. Belarus, Turkey, Ukraine) as the network accessibility needs to be guaranteed also within other regions to enhance the overall level of intermodal transport performances. For this purpose, additional and new inputs, which will be defined in future works, are required. An important point for future research activities focus on the integration of existing systems. A major challenge will be to provide and share information to and in the different tools. The interconnection of ICT applications with defined information flows between stakeholders in the transport industry is seen as critical factor to build up cooperative structures to enhance intermodal transport procedures. It is possible to integrate further transport services into the *FLAVIA* tool such as possible positions and tracks on a railway path. Through the transparent integration of important information along several routes (based on GPS equipment) several bottlenecks can be identified and appropriate actions can be set. The combination of the presented accessibility attempt and the configuration of several parameter/attributes in the network/terminals can together help to remove given barriers, especially within intermodal transport, in a more efficient way.

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